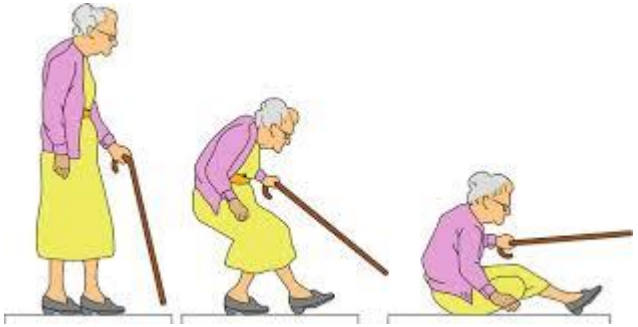
Falls Screening, Differential Diagnosis, Evaluation, and Treatment

Dr. Aminalroaya
Geriatric specialist,
Assisted professor of TUMS

INTRODUCTION

- ❖ Falls often go without clinical attention for a variety of reasons:
- Patient never mentions event to healthcare Provider
- No injury at the time of the fall
- Provider fails to ask patient about history of falls
- Either provider or patient believes that falls are inevitable part of aging process.
- Often, treatment of injuries resulting from fall not include investigation of cause of fall.

Epidemiology of Falls in Older Adults



Epidemiology

- Defined as: an unintended event ,a person comes to rest on the ground, floor, or other lower level without known loss of consciousness.
- Falls in elderly are major public health problem worldwide.
- Incidence of falls in community-dwelling individuals in US affects 1 in 3 persons aged ≥65
- Incidence increases to 1 in 2 persons aged ≥ 80.
- Worldwide, persons ≥ 70 have increased risk of fall-related mortality compared to younger people.
- Severity of fall-related complications increases with age

Epidemiology

- 45–70%of long-term care patients fall annually
- Up to 27% of hospitalized patients in acute geriatric wards have incident falls
- 60 % of patients with a fall history in the previous year will sustain a subsequent fall

Consequences of falling

Minor injuries Bruises Lacerations	Major injuries Fractures Traumatic brain injury
Long lies Rhabdomyolysis Dehydration Pneumonia Pressure sores	Fear of falling Restriction of activity Social isolation Depression
Pain	Functional disability
Emergency room visits and hospitalizations	Nursing home placement

Consequences of falling

- Lifetime risk of hip fx is 17.5% in women and 6% in men, associated with high mortality.
- After hip fx, rate of in-hospital mortality 2.7%, 6-month 19%, 1-year is 26%.
- Only half of those surviving hip fx regain baseline ability to perform ADLs (bathe, dress, groom, toilet, eat, and transfer).
- Decline after hip fracture is also in iADLs, mobility, and cognitive status

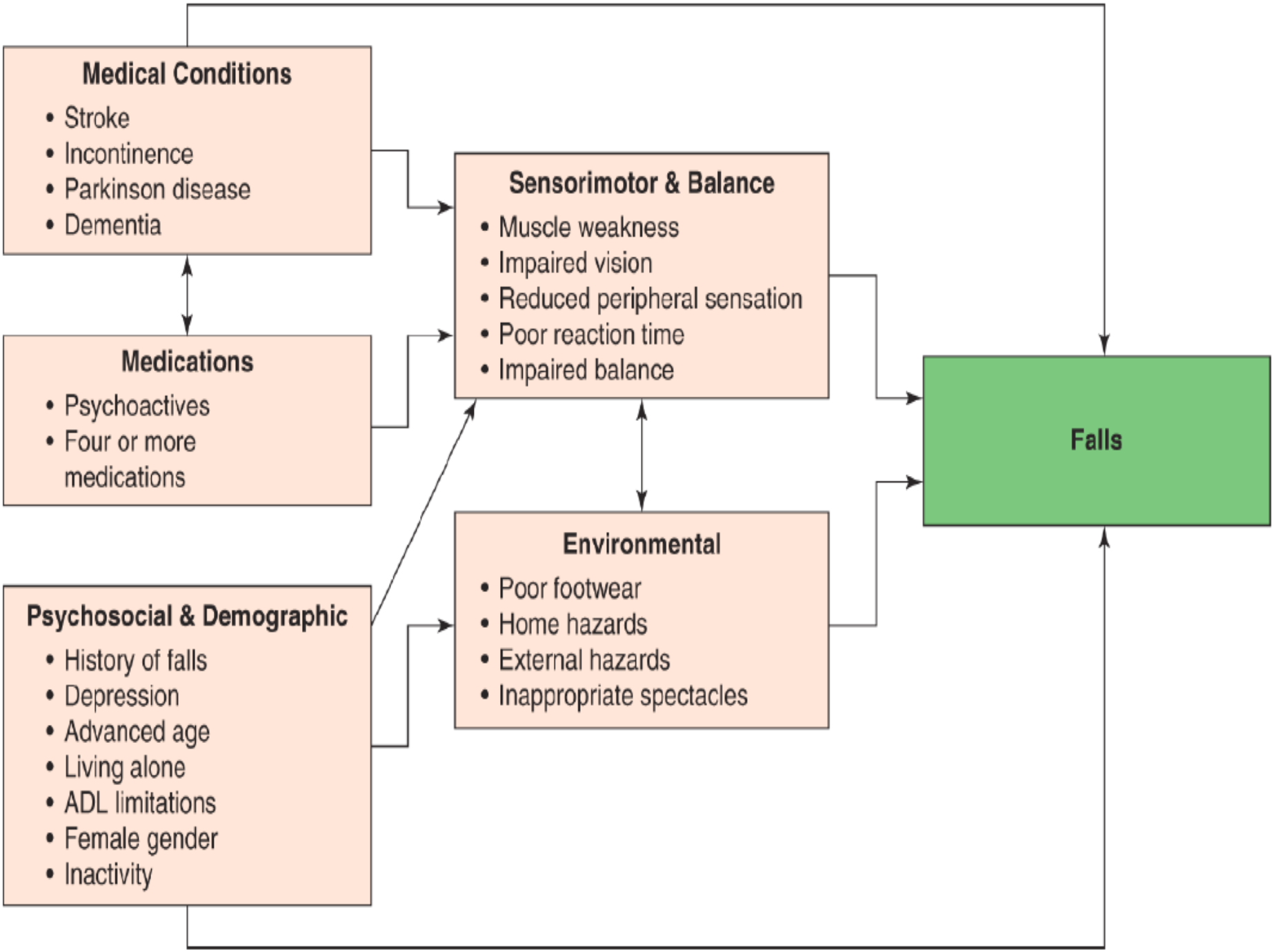
Consequences of falling

- CDC reported during 2014, 29 million falls in older adults, resulting in 7 million injuries, and 27,000 deaths as a result of falls.

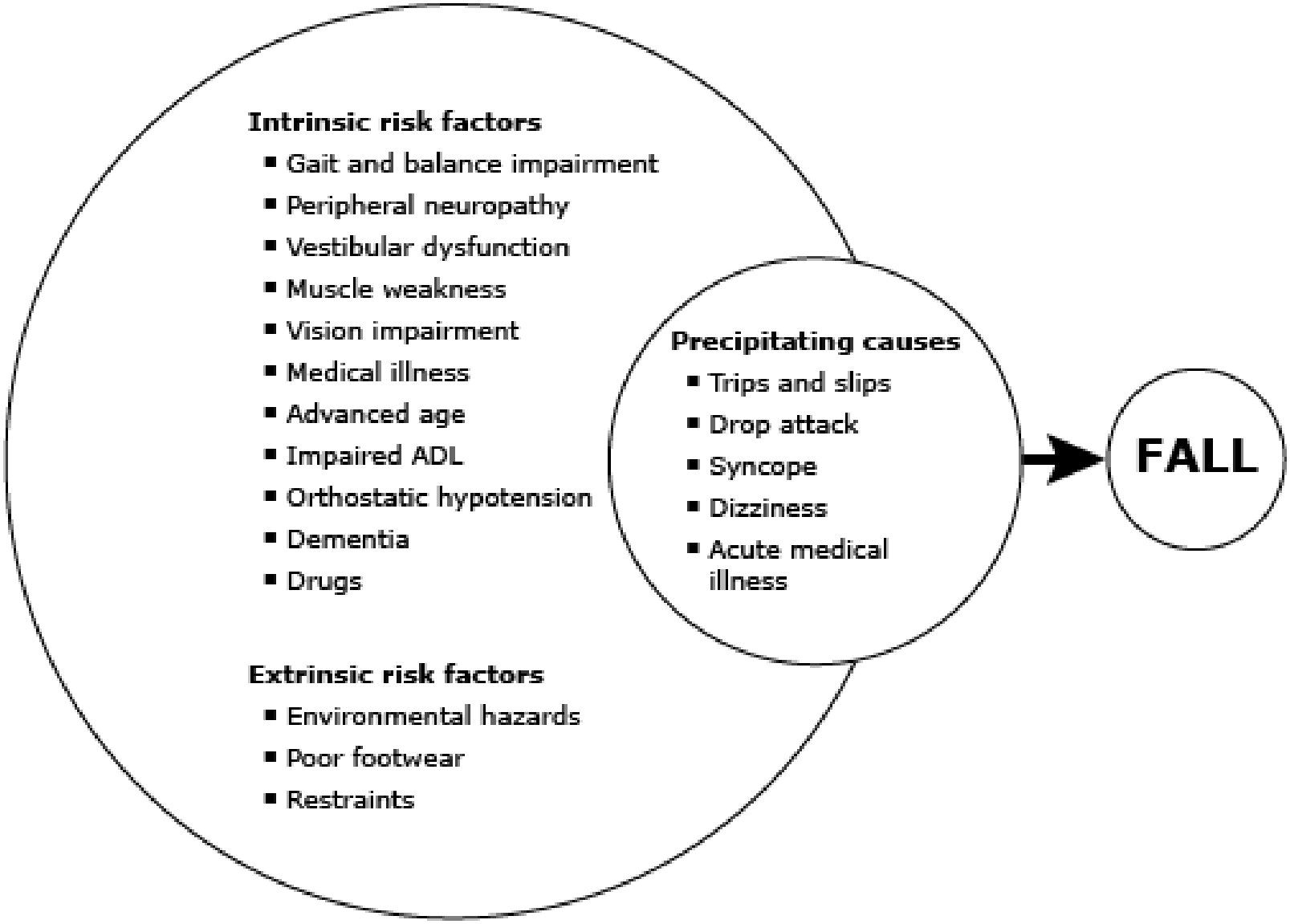
Consequences of falling

- According to BRFSS 2014, annual costs at $31.3 billion
- With expanding geriatric population, annual health-care costs expected to rise.
- Falls are leading risk factor for nursing home placement and greater use of medical services
- Given incidence , high rate of morbidity ,mortality, care of older patients requires evaluation of fall history, fall risk, fall prevention strategies.

Risk Factors of Falls


Medical Conditions
• Stroke
• Incontinence
• Parkinson disease
• Dementia
Medications
• Psychoactives
• Four or more medications
Psychosocial & Demographic
• History of falls
• Depression
• Advanced age
• Living alone
• ADL limitations
• Female gender
• Inactivity
Sensorimotor & Balance
• Muscle weakness
• Impaired vision
• Reduced peripheral sensation
• Poor reaction time
• Impaired balance
Environmental
• Poor footwear
• Home hazards
• External hazards
• Inappropriate spectacles
Falls

The multifactorial and interacting causes of falls



Risk factors with highest relative risk or odds of falling

Risk factor	RR-OR[a]
Muscle weakness	4.4
History of falls	2.0
Gait deficit	2.9
Use of assistive device	2.6
Visual deficit	2.5
Arthritis	2.4
Impaired ADL	2.3
Depression	2.2
Cognitive impairment	1.8
Age > 80 years	1.7

Risk Factors of Falls

- Beyond considering specific fall risk factors, it is also important to remember a fall may actually represent an atypical presentation of disease.

Differential diagnosis of falls

Category	Diagnosis
Cardiovascular	Arrhythmia Carotid sinus syndrome Myocardial infarction Orthostatic hypotension Postprandial hypotension Syncope Vasovagal syndrome
Cognitive or psychiatric	Delirium Dementia Depression
Endocrine disorders	Adrenal insufficiency Hypothyroidism Thyrotoxicosis
Drugs	Medication effects or polypharmacy Substance abuse
Hematologic disorders	Anemia
Infectious diseases	Infection/sepsis Influenza
Metabolic derangements	Dehydration Hyponatremia Hypoglycemia/hyperglycemia Hypokalemia/hyperkalemia
Musculoskeletal	Deconditioning Gait disorders
Neurologic	Cerebrovascular accident Movement disorders (Parkinson's disease) Peripheral sensory neuropathy Seizure Subdural hematoma Transient ischemic attack Vestibular dysfunction Visual impairment
Renal disorders	Acute kidney injury Chronic kidney disease

Environmental hazards contributing to falls

Community setting	Hospital and/or long-term care facility
Clutter obstructing paths	Wet or slippery floors
Electric cords	Bedrails
Throw rugs, loose carpet	Restraints
Poor lighting	Intravenous lines
Lack of non-slip bathmats or grab bars	Oxygen tubing
Unsafe footwear	Foley catheters
Stairwells	

Medications

- Medication is important **modifiable risk factor**
- Greater number of medications (of any type),
- Certain medication classes
- Recent medication dose adjustments

Medications

- Polypharmacy: using more than four medications, is common in older and increases fall risk.
- Medications affect CNS, including
- Neuroleptics,
- Sedatives, hypnotics,
- Benzodiazepines,
- Antipsychotics
- Antidepressants,

Medications

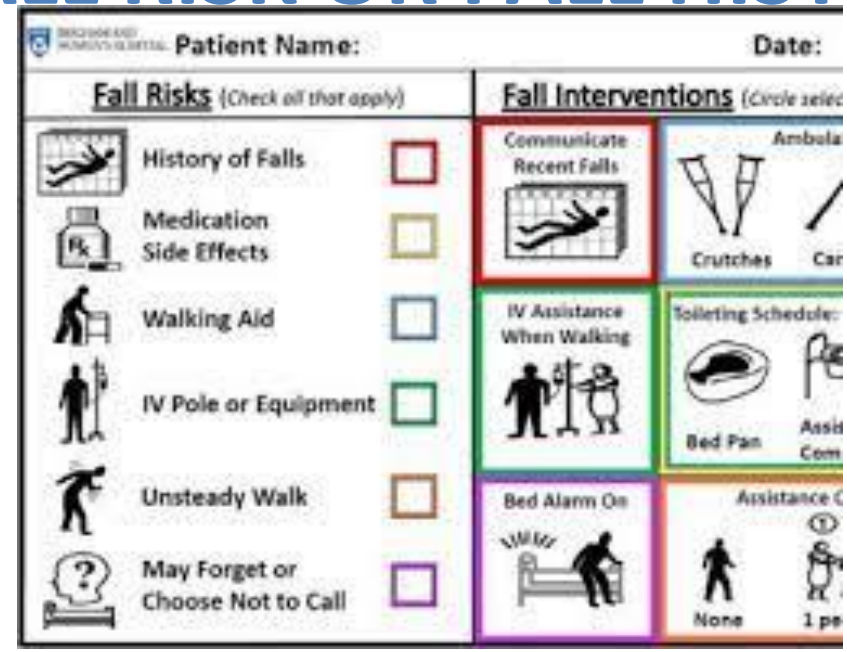
- Antihypertensive medications, in particular vasodilators, associated with increased risk of falling.
- Beta-blockers not appear have a significant effect on fall risk
- While diuretics contribute a minimal increased risk of fall

Odds of falling by high-risk medication class

Medication class	Odds ratio
Antidepressants	1.68
Neuroleptics and antipsychotics	1.59
Benzodiazepines	1.57
Sedatives and hypnotics	1.47
Antihypertensives	1.24
Non-steroidal anti-inflammatories	1.21
Diuretics	1.07
Beta-blockers	1.01
Narcotics	0.96

EVALUATION FOR PATIENTS WITH INCREASED

FALL RISK OR FALL HISTORY



Fall Screening

- AGS, British Geriatrics Society's (BGS), and American Academy of Orthopedic Surgeons (AAOS) Guidelines for the Prevention of Falls in Older Persons recommend:

✓All older adults be screened annually for falls, as well as any problems with balance or walking.

Examples of fall risk screening tools

Setting	Screening tool
Community	"Get Up and Go" test (TUG) Functional Reach Test
Hospital or acute care facility	St. Thomas Risk Assessment Tool (STRATIFY) Hendrich II Fall Risk Model
Long-term care facility or nursing homes	Care Home Falls Screen (CaHFRiS) Morse Fall Scale

Fall History and Screening

- Fall risk assessment varies by target population.
- A fall risk assessment as part of routine primary care visit for a low-risk patient is brief.
- A brief evaluation includes two central questions:

✓**1. Have you fallen in the past year?**

✓**2. Do you have trouble with walking or balance?**

Fall History and Screening

❖High-risk groups include patients with a history of falls and recurrent falls,

- balance and walking difficulties,
- living in long-term care facilities.

❖If initial screening questions positive or patient belongs to high-risk group,

✓multifactorial fall risk assessment recommended

Fall History and Screening

- A comprehensive historical assessment includes a detailed history regarding
- Specific circumstances of a prior fall (including witness account when available)
- Questions focused on potential fall risk factors.
- Medical comorbidities
- Current medications
- Substance use
- Environmental risk factors
- General functional status.

Fall History and Screening

- Identified risk factors may be

❖Modifiable (muscle weakness, home hazards, or medication side effects)

❖Non-modifiable (history of falls, neurologic conditions, and cognitive impairment).

- Treatment planning for high-risk patients includes a multifactorial intervention based on specific risk factors

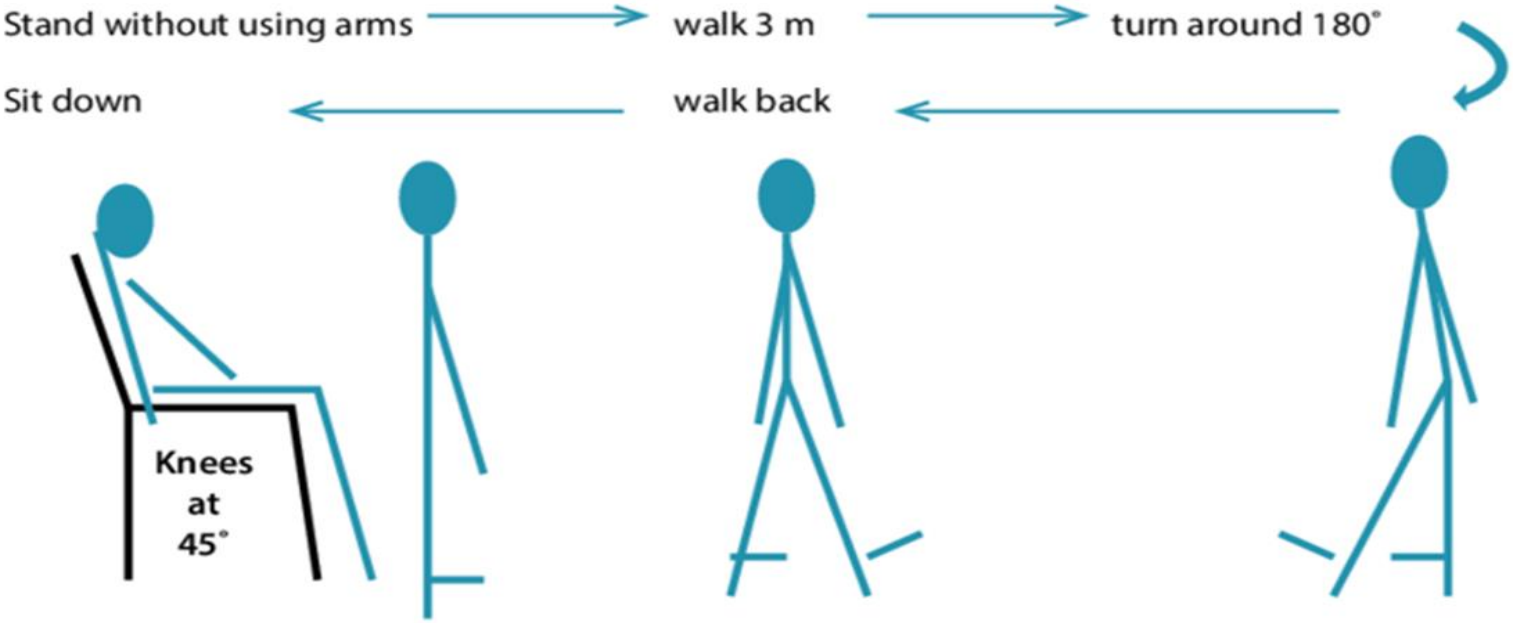
Physical Examination

- ❖ Physical examination should include examination of
- ✓ orthostatic vital signs,
- ✓ Visual acuity,
- ✓ Auditory screen,
- ✓ Cardiac system,
- ✓ Musculoskeletal strength and range of motion,
- ✓ Neurologic function (including vibration and proprioception),
- ✓ Gait, balance
- ✓ Cognition.
- ❖ Additional aspects of physical examination should focus upon individual risk factors.

Gait and Balance Assessment

- A useful assessment tools for assessing gait and balance include “Get Up and Go” test (TUG)
- Requires only a short time to perform.
- Older persons who fall in last year or difficulty with balance and gait should evaluated

' Get Up and Go' test



Pathologies/gait abnormalities

Use arms to stand = proximal weakness
Sway/stagger = poor postural control

Stagger/>3 steps in 180° turn = poor postural control

Characteristic abnormal gait patterns

- Spastic hemiparetic, spastic, frontal lobe gait apraxia, parkinsonian, antalgic
- Foot drop/motor neuropathy (slapping feet), high stepping (dorsal columns)
- Waddling (hip weakness), vestibular (swaying, falling to one side), ataxic
- Fear of falling – slow, wide based, small stride, shuffling, foward centre of gravity

The "Get up and go" test for gait assessment in older adult patients

The "Get up and go" test for gait assessment in older adult patients[1]	
Have the patient sit in a straight-backed high-seat chair	
Instructions for patient:	
Get up (without use of armrests, if possible)	
Stand still momentarily	
Walk forward 10 feet (3 meters)	
Turn around and walk back to chair	
Turn and be seated	
Factors to note:	
Sitting balance	
Transfers from sitting to standing	
Pace and stability of walking	
Ability to turn without staggering	
Modified qualitative scoring[2]	
(1) No fall risk	Well-coordinated movements, without walking aid
(2) Low fall risk	Controlled, but adjusted movements
(3) Some fall risk	Uncoordinated movements
(4) High fall risk	Supervision necessary
(5) Very high fall risk	Physical support of stand by physical support necessary
Timed test reference values (record time from initial rising to re-seating)[3]	
Age (years)	**Mean time in seconds (95% CI)**
60 to 69	8.1 (7.1 to 9.0)
70 to 79	9.2 (8.2 to 10.2)
80 to 99	11.3 (10.0 to 12.7)

' Get Up and Go' test

- TUG shown some predictive value, time greater than 12 seconds indicates impaired functioning in community-dwelling elders.
- If the patient is unable to complete test or appears unsteady during examination, referred patient to physical therapy for further evaluation.
- If examination is normal for age group, no further assessment is required.
- If TUG is abnormal a complete fall history and physical examination is warranted

Diagnostic Evaluation

- Expert consensus recommends baseline diagnostic testing for patients at high risk of falling or a history of falls.
- CBC, serum chemistry, BS, and TFT rule out causes of fall ;anemia, dehydration, autonomic neuropathy related to diabetes, and metabolic disease related to thyroid dysfunction .
- Serum 25-OH vit D levels identify community-dwelling elderly with vitamin D deficiency
- Additional testing may indicated based on history and physical examination.
- VitB12 levels should obtained to evaluate etiology of peripheral neuropathy.

Diagnostic Evaluation

- Cardiac monitoring for arrhythmia
- EEG for seizure activity,
- Neuroimaging to evaluate ischemic disease or hydrocephalus only indicated if findings from history or p/x highly suggestive of these conditions.
- ECHO may be considered in patients with heart murmurs thought to contribute to the etiology of a fall.
- Spine radiographs or (MRI) may useful in patients with gait disorders or abnormalities on neurologic examination.

Fall Prevention: Community-Dwelling Adults

Fall Prevention

- Evidence-based single interventions including
- Exercise,
- Medication management,
- Visual interventions,
- Home safety evaluations and interventions .

Fall Prevention

- Multifactorial and multicomponent interventions
- simultaneous implementation of more than one fall prevention measure, such as physical therapy, home hazard reduction, and medication review.

Single Intervention Strategies in Community-Dwelling Adults

Exercise

- Multiple trials and meta-analysis show exercise reduces falls in elderly by 13–40% .
- Fall prevention exercise programs also reduce fall-related injuries
- Exercise covers a wide range of physical tasks (balance, strength, flexibility, etc) in many formats
- A systematic review showed greater effects are seen in programs include medium- to high-intensity balance training and have a higher dose of exercise

Medication Management

- ❖ Polypharmacy and certain medication classes are known risk factors.
- One study found intensive intervention for primary care physicians included education on medication management, and feedback on prescribing practices resulted in 36% fewer falls and 54%fewer injuries requiring medical attention.
- A study of a medication intervention to prevent falls found gradual withdrawal of psychotropic medications in >65 reduced rate of falls by 66%

Vitamin D Supplementation

- All patients > 65 with low serum 25-OH Vit D (<10 ng/mL or 25 nmol/L) are at risk loss of muscle mass and strength and have a higher risk of hip fracture
- vitamin D supplementation improve bone density and muscle function in such patients.
- The effect of vitamin D supplementation on fall prevention in elderly remains controversial, as previous studies that vitamin D supplementation decreased fall risk.

Vitamin D Supplementation

- Those with risk factors for low vitamin D based on diet, sun exposure history, history of malabsorption, or obesity,
- Slow gait speed (<0.8 m/second),
- Difficulties rising from a chair
- Slow Timed Up and Go Test
- Problems with balance.

Vitamin D Supplementation

- AGS 2014 concluded in community-dwelling adults, goal 25-OH Vit D minimum is 30 ng/mL (75 nmol/L)
- Vit D supplementation of at least 1000 IU per day is recommended to all patients >65 years of age to reduce the risk of fractures or falls

Cardiovascular Interventions

- In patients with recurrent falls, in the **absence** of gait and balance problems or other fall RF, clinicians consider detailed cardiac assessment.
- Underlying cardiac conditions include orthostatic hypotension,carotid sinus syndrome, and vasovagal syndrome
- Studies evaluating efficacy of pacemaker implantation in patients with carotid sinus hypersensitivity found persons had a reduction in fall rate

Visual Interventions

- Nonsurgical vision correction alone not shown to prevent or reduce falls and even increase fall risk
- A trial of expedited first cataract surgery (4 weeks versus 12 months) showed intervention group had significantly lower fall rate (34% reduction) and 67% reduced relative risk of fracture.
- A follow-up trial of cataract surgery for the second eye reduced falls by similar amount (32%); however, not meet statistical significance

Environmental and Home Safety Interventions

- Meta-analysis of home safety assessments and interventions found these strategies were effective in reducing the rate of falls and risk of falling
- These interventions were particularly effective for patients at higher fall risk,when home safety implementations conducted by an OT.
- AGS and BGS Guidelines recommend a home safety assessment and intervention for patients with previous fall history or at high risk of falls

Multifactorial Interventions in Community-Dwelling Adults

Multifactorial Interventions in Community-Dwelling Adults

- Falls are typically the result of impairments in multiple domains;
- Multifactorial interventions are tailored prevention approaches based on individual fall risk assessments
- Meta-analyses conclude that multifactorial approach is beneficial for community-dwelling older adults if interventions are provided directly, rather than simply recommendations or referrals

Multifactorial Interventions

- AGS and BGS guidelines recommend multifactorial interventions include following components:

✓ Gait training (including education for assistive device use),

✓ Medication review and modification,

✓ Exercise programs (with balance and gait training as one component),

✓ Treatment of postural hypotension and cardiovascular disorders,

✓ Modification of environmental hazards

A multifactorial intervention for fall prevention in community-dwelling patients

Risk factor	Provider intervention	Patient education
Balance or gait instability	Refer to physical therapy to initiate validated exercise programs (including strength, balance, and gait training) Recommend tai chi Prescribe assistive device and review proper use	Use assistive device as instructed Wear nonskid, well-fitting footwear covering the entire foot, with thin sole and low heel Consider emergency call device
Polypharmacy (≥4 medications)	Prescription review with medication risk assessment Discontinue unnecessary medications (particularly psychotropics if possible) Recommend nonpharmacological treatment when possible	Maintain active medication list (including herbals, supplements, and over the counter prescriptions) Bring medication list to all medical visits Use pillbox to avoid medication errors
Cardiovascular risks (orthostatic hypotension, carotid sinus syndrome)	Orthostatic hypotension Measure orthostatic vital signs Reduce contributing medications Liberalize salt in diet Carotid sinus syndrome Consultation for pacemaker implantation	Orthostatic hypotension Drink sufficient water daily Avoid sudden change in position Wear compression stocking if tolerated
Visual impairment	Inquire about vision Screen for visual acuity Ophthalmology referral Recommend early cataract surgery when indicated	Schedule routine vision testing Do not wear reading glasses when walking Avoid multifocal glasses in outdoor setting (bifocals blur ground-level hazards)
Environmental and home hazards	Perform or refer visiting nurse/occupational therapy to complete home safety assessment Provide check list to patient or caregiver to assess home safety	Ensure well-lit environment (including nightlights) Remove area rugs and slippery throw rugs Remove clutter and ensure clear walking paths are available Install handrails accompanying stairs and grab bars in bathrooms

Preventing Fall Complications

- While single and multifactorial intervention strategies may help to prevent falls in community, acute care, and long-term care facilities, these care plans do not prevent falls entirely.
- Devices have been developed with the aim of preventing falls or injuries from falls in patients at high risk, including assistive devices, hip protectors, and call alarm systems.

Assistive devices

- Health-care providers should routinely assess for proper assistive device use and fit.
- For a cane, top of handle should be at level of the superior aspect of greater trochanter
- At break of wrist when patient stands upright with arms at their side.
- Further, when holding a cane, there should be approximately a 15-degree bend at elbow.

Assistive devices

- Walkers are preferred when balance is poor and a cane does not offer sufficient stability.
- Front-wheeled walkers allow for a more natural gait and are preferred in patients with cognitive impairment.
- Rollator walkers or four-wheeled devices allow for a faster gait pace but require increased coordination and processing speed as these devices require use of the brakes